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Use of Wild Date Palm (*Phoenix reclinata*) by Mahale Chimpanzees: A Likely Case of Social Learning via Direct Observation

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INTRODUCTION

The propagation of knowledge from one individual to other group members is an essential aspect of chimpanzee (*Pan troglodytes*) culture (McGrew 2004). It is important to record when and how chimpanzees acquire new knowledge. Furthermore, it is useful to know how novices learn the innovation and to what extent they can replicate the behavior, so as to provide insight into whether the information will propagate through the group. The M-group chimpanzees in Mahale Mountains National Park, Tanzania, customarily fish for ants. They do so by creating probes from many kinds of plant materials, inserting these into the entrance of the nest of wood-boring carpenter ants (*Camponotus* spp.), then withdrawing the probes, and eating the ants (Nishida 1973; Nishie 2011). Chimpanzees in some regions utilize the wild date palm (*Phoenix reclinata*, hereafter date palm) for different purposes. For example, chimpanzees in Toro-Semliki, Uganda, eat the fruits of date palms (McLennan 2013) and squeeze the stem of the date palm into their mouths (McGrew & Hunt 2011). Although date palms are also common in the M-group's home range (Itoh 2015), there have been no previous reports that the M-group chimpanzees have utilized date palms for ant-fishing. In this article, I describe the first documented observation in Mahale of two chimpanzees processing date palm to use as probes for ant-fishing.

METHODS

I have intermittently studied habituated wild chimpanzees (*P. troglodytes schweinfurthii*) of the M-group since January 2002 (see Nakamura *et al.* 2015 for details of the research site). The research period of this study was from August 24 to 31, 2018. All the group members have been identified and named, and the demographic data, such as kinship, estimated date of birth, and immigration into the M-group, is available to researchers. Focal animal sampling was used to collect data with a continuous recording method (Martin & Bateson 2007). Data was recorded with a digital video camera (Sony HDR-CX430V) and on field notes. KP, KP18, JR, and XT in the description refer to the names of individuals. The sizes of the used objects were estimated, since they could not be collected.

OBSERVATION

At 12:53 h on August 30, 2018, I started to follow KP18 (4-month-old male) along with his mother, KP (approximately 15-year-old female). At 14:10 h, KP was holding her infant son KP18 clasped to her belly and started to eat the pith of a woody vine, *Landolphia owariensis*. Carpenter ants inhabiting the tree and entrance holes of the ants' nests were visible 3 m above the tree trunk. Date palms were growing next to the tree, and the leaflets covered the trunk. At 14:11:30 h, KP climbed up the vines, approached the hole of an ant nest, and tore up a leaflet of a date palm from the tip to the rachis to make a probe (length: ca. 60 cm; width: ca. 0.5 cm). Then, she started to fish for ants using the probe with her right hand, and had a spare probe held in her left groin pocket. At 14:15:12 h, KP bit off the tip of the probe to adjust it and continued ant-fishing.

At 14:17:03 h, JR (5-year-old female) approached KP whilst pant-grunting. At 14:18:11 h, JR approached KP and started watching her fish for ants at close range (Figure 1). At 14:18:41 h, JR sitting on a vine bit the tip of a leaflet of a date palm, tore it up with her mouth and hands, and removed it at the rachis. JR adjusted the tip of the leaflet by biting it (length: ca. 70 cm; width: ca. 0.7 cm) and again watched KP fishing for ants. At 14:19:13 h, JR started to fish for ants next to KP.

At 14:20:00 h, KP climbed down the tree, leaving the probe in the hole and walked away with KP18, while JR continued ant-fishing. At 14:20:06 h, JR moved to the hole, which KP had used moments before, and continued fishing. At 14:20:13 h, JR climbed down the tree and walked away. At 14:20:17 h, XT (approximately 26-year-old female) climbed up and removed a part of the vine of *L. owariensis* (length 20 cm, and width 0.5 cm, approximately) to start fishing for ants at 14:20:31 h, in the hole that KP and JR had both used. See Video 1 available online at http://mahale.main.jp/PAN/2018/010.html.

After the 8-days of this study, I checked the long-term records, and also asked researchers and research assistants whether they had observed the M-group chimpanzees using date palm for ant-fishing. None of them had ever observed the usage of wild date palm for ant-fishing by the M-group members.

DISCUSSION

Two non-kin females used the leaflets of a date palm to fish for carpenter ants. For more than fifty years of study in the M-group and the extinct K-group (Nishida

Figure 1. KP is removing ants from the probe made of date palm (left). JR (right) is watching KP's actions. The leaflets of the wild date palm are covering the tree from the right side. This figure was captured from the video.

& Hasegawa 1982), researchers have never observed the Mahale chimpanzees using date palm for ant-fishing until this instance. Of course, this does not necessarily mean that they have never actually used date palm. In the home range of the M-group, three Palmae species occur: date palm, palmyra palm (*Borassus* sp.), and oil palm (*Elaeis guineensis*) (Itoh 2015; Itoh & Nakamura 2015). Albeit rare, there are a few reports that Mahale chimpanzees ate piths of the oil palm (Zamma *et al.* 2011). Thus, the possibility cannot be excluded that the Mahale chimpanzees, including KP and JR, already had experience handling Palmae species infrequently and acquired knowledge of the physical features of the leaflet of date palm before this instance. Even so, it is certain that they have used date palm only at low frequency, since no researchers so far had noticed. Nishida *et al.* (2009) operationally defined an innovation as a behavioral pattern seen by observers for the first time after a sufficient time of long-term observation passed. Here, recognizing these observational limits, KP's use of date palm may be regarded as an example of innovation, according to this operational definition.

Each action constituting ant-fishing using date palm by both individuals, KP and JR, seems similar to those using common materials for ant-fishing. Their ant-fishing processes involved all four actions that typically constitute ant-fishing behavior; creating probe, inserting probe, withdrawing probe, and removing ants from probe (Nishida 1973; Nishie 2011). In addition, it took KP and JR only a few seconds, at most, to create the probes from date palm and they also prepared spare probes. Since they could create probes with the purpose of fishing for ants from possibly unfamiliar materials through acquired techniques, KP's case is not considered as an innovation of a novel behavior itself, but as an upgrade of knowledge on available materials to create tools (Nishida *et al.* 2009).

A juvenile female, JR, closely watched KP fishing for ants and then started processing a leaflet of date palm and fished for ants with the tool she made, next to KP, despite having never or rarely used date palm before, nor observing the tool making process by KP. It is unlikely that two chimpanzees independently started using the unfamiliar material in close succession. JR's acquisition of the knowledge to use the date palm suggests that social learning via direct observation played an important role in transmitting the knowledge from a skilled individual to a novice (Nishida *et al.* 2009). JR created an ant-fishing tool from a leaflet of date palm without watching the model's (KP's) actions, and JR already knew the techniques of how to create ant-fishing probes with plants that the M-group members normally used. Thus, the social learning in JR's case is likely to be emulation (Boesch & Tomasello 1998). That is, JR may have observed KP's ant-fishing and inferred that the material of her probe was made from a leaflet of the date palm that was growing near the tree where the ant-fishing was occurring. After inferring the goal of making a probe with new material and comprehending the physical features of the leaflets of date palm, which have parallel veins (Tomlinson *et al.* 2011) making it easy for chimpanzees to tear the leaflets from the tips to the rachis, JR created a probe by trial-and-error. This observation supports previous reports, such as the mechanism of propagation of a tool using technique from one innovator to a novice through social learning via direct observation in the Sonso community of the Budongo Forest, Uganda (Hobaiter *et al.* 2014).

It is important to keep accumulating data on newly

acquired knowledge and the propagation process among group members in order to understand what produces cultural differences among wild chimpanzee groups.

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